L Number	Hits	Search Text	DB	Time stamp
1	1	("5989999").PN.	USPAT; US-PGPUB	2003/03/08 13:29
2	298	((etching or cleaning) with silicide) same (chlorine or hydrochloric or hydrofluoric)	USPAT; US-PGPUB	2003/03/08 13:56
3	178	(((etching or cleaning) with silicide) same (chlorine or hydrochloric or hydrofluoric)) and @ad<=19980407	USPAT; US-PGPUB	2003/03/08 13:56
4	142	((((etching or cleaning) with silicide) same (chlorine or hydrochloric or hydrofluoric)) and @ad<=19980407) and selective$2	USPAT; US-PGPUB	2003/03/08 13:57
5	16	((((etching or cleaning) with silicide) same (chlorine or hydrochloric or hydrofluoric)) and @ad<=19980407) and (selective$2 with depositi$2)	USPAT; US-PGPUB	2003/03/08 13:57

US-PAT-NO: 6140247

DOCUMENT-IDENTIFIER: US 6140247 A

TITLE: Semiconductor device manufacturing method

---------- KWIC ---------

The present inventors studied a method of removing the oxide formed on a
silicide layer, and found a novel fact as follows. More specifically,
according to the study of the present inventors, when anhydrous **hydrofluoric**
acid gas is particularly employed as the **etching** gas to remove the oxide formed
on the **silicide** layer, the oxide can be sufficiently removed without **etching**
the silicide layer.

Then, as shown in FIG. 14C, after the TiSi.sub.2 layer 146 is heated to
350.degree. C., SiH.sub.4 and WF.sub.6 are supplied onto the contact hole
while the TiSi.sub.2 layer is maintained at this temperature, thereby
selectively depositing a W layer 149 on the TiSi.sub.2 layer 146.

The interior of the **deposition** chamber 184 is evacuated to 1.times.10.sup.-7
Torr, and WF.sub.6 gas, SiH.sub.4 gas, and hydrogen gas are introduced into the
deposition chamber 184, thereby **selectively** forming a W layer in only the
contact hole in accordance with known **selective** vapor **deposition**.

In this embodiment, the W film **selective** forming method in accordance with
vapor **deposition** is described. However, the present invention can also be
applied to a method in which a silicon substrate

(processing target substrate)
is processed by using anhydrous hydrofluoric acid gas and thereafter a silicon
film or a silicon oxide film is formed on the silicon substrate.

[redacted]

US-PAT-NO: 5162259

DOCUMENT-IDENTIFIER: US 5162259 A

TITLE: Method for forming a buried contact in a semiconductor device

---------- KWIC ---------

A process for forming a buried contact (50) in a semiconductor device (20)
which avoids etch damage to the substrate and forms a self-aligned, low
resistance contact to a silicon substrate (22) is provided. After forming a
contact opening (32) through overlying insulating and conducting layers (24,
28,30), a silicide region (40) is formed in the substrate at the contact
surface (34) exposed by the contact opening (32). A refractory metal silicide
which provides high etching selectivity to polysilicon is formed in the
substrate at the contact surface (34) by either a blanket **deposition** of a
refractory metal into the contact opening (32), or alternatively, by a
selective deposition process using contact surface (34) as a nucleation site.
In a preferred embodiment, a cobalt or tantalum silicide region (40) is formed
in the substrate at the contact surface (34) and a conductive layer (42) is
deposited and etched to form an interconnect (48) contacting the silicide
region (40). The high etching selectivity obtainable between the conductive
layer (42) and the silicide region (40) avoids damage to the substrate surface
providing improved device performance.

Once the formation of silicide region 40 is complete, insulation layer 30 and

sidewall spacer 36 are removed by an isotropic etch. In the preferred
embodiment wherein insulation layer 30 is silicon nitride and sidewall spacer
36, the isotropic etch is performed in a wet chemical bath using an aqueous
phosphoric acid solution. Alternatively, in the case in which insulation layer
30 is silicon oxide and silicide region 40 is cobalt silicide, a dilute aqueous
hydrofluoric acid solution buffered with ammonium fluoride and including a
surfactant such as ethylene glycol can be used. In certain processing
situations it may be advantageous to perform an extended cleaning of the
surface of semiconductor device 20 prior to the deposition of overlying
conductive layers. In cases where the contact surface 34 is to be exposed to
cleaning using a **hydrofluoric** acid solution, **silicide** region 40 is preferably
tantalum **silicide**.

US-PAT-NO: 4910578

DOCUMENT-IDENTIFIER: US 4910578 A

TITLE: Semiconductor device having a metal electrode interconnection film with
two layers of silicide

---------- KWIC ----------

Referring to FIG. 3E, interlayer insulating films 6a and 6b are formed on the
surfaces of the TiSi.sub.2 film 4 and the insulating films 2a and 2b through,
e.g., a chemical vapor **deposition** (CVD) method, while a contact hole 7 is
selectively formed on a region of the TiSi.sub.2 film 4 through a
photolithography process and an etching process.

The said ternary **silicide** films 30 are sufficient in corrosion resistance
against **hydrofluoric** acid in comparison with the TiSi.sub.2 films 4 unless Y=0,
and are sufficiently resistant against removal of the aforementioned oxide film
through **etching**.

L Number	Hits	Search Text	DB	Time stamp
1	1	("5989999").PN.	USPAT; US-PGPUB	2003/03/08 10:30
2	1	("5416045").PN.	USPAT; US-PGPUB	2003/03/08 10:31
3	1	("5376405").PN.	USPAT; US-PGPUB	2003/03/08 10:32
4	284	cleaning with silicide	USPAT; US-PGPUB	2003/03/08 10:38
5	42	cleaning with silicide same (chlorine or hydrochloric or hydrofluoric)	USPAT; US-PGPUB	2003/03/08 10:38
6	16	(cleaning with silicide same (chlorine or hydrochloric or hydrofluoric)) and @ad<=19980407	USPAT; US-PGPUB	2003/03/08 11:02
7	5	(cleaning with (titanium adj silicide)) same (chlorine or hydrochloric or hydrofluoric)	USPAT; US-PGPUB	2003/03/08 10:39
8	3	((cleaning with (titanium adj silicide)) same (chlorine or hydrochloric or hydrofluoric)) not ((cleaning with silicide same (chlorine or hydrochloric or hydrofluoric)) and @ad<=19980407)	USPAT; US-PGPUB	2003/03/08 10:38
9	14	cleaning same (titanium adj silicide) same (chlorine or hydrochloric or hydrofluoric)	USPAT; US-PGPUB	2003/03/08 10:39
10	11	(cleaning same (titanium adj silicide) same (chlorine or hydrochloric or hydrofluoric)) not (((cleaning with (titanium adj silicide)) same (chlorine or hydrochloric or hydrofluoric)) not ((cleaning with silicide same (chlorine or hydrochloric or hydrofluoric)) and @ad<=19980407))	USPAT; US-PGPUB	2003/03/08 11:00
11	1	("5989999").PN.	USPAT; US-PGPUB	2003/03/08 11:01
12	58	(titanium adj silicide) with cleaning	USPAT; US-PGPUB	2003/03/08 11:10
13	55	((titanium adj silicide) with cleaning) not (((cleaning with (titanium adj silicide)) same (chlorine or hydrochloric or hydrofluoric)) not ((cleaning with silicide same (chlorine or hydrochloric or hydrofluoric)) and @ad<=19980407))	USPAT; US-PGPUB	2003/03/08 11:02
14	53	(((titanium adj silicide) with cleaning) not (((cleaning with (titanium adj silicide)) same (chlorine or hydrochloric or hydrofluoric)) not ((cleaning with silicide same (chlorine or hydrochloric or hydrofluoric)) and @ad<=19980407))) not ((cleaning with silicide same (chlorine or hydrochloric or hydrofluoric)) and @ad<=19980407)	USPAT; US-PGPUB	2003/03/08 11:02
15	25	((((titanium adj silicide) with cleaning) not (((cleaning with (titanium adj silicide)) same (chlorine or hydrochloric or hydrofluoric)) not ((cleaning with silicide same (chlorine or hydrochloric or hydrofluoric)) and @ad<=19980407))) not ((cleaning with silicide same (chlorine or hydrochloric or hydrofluoric)) and @ad<=19980407)) and @ad<=19980407	USPAT; US-PGPUB	2003/03/08 11:43
16	6	(titanium adj silicide) with cleaning	EPO; JPO; DERWENT	2003/03/08 11:43
17	2	(titanium adj silicide) same Titanium same (selective with depositing)	EPO; JPO; DERWENT	2003/03/08 11:47
18	23	(titanium adj silicide) same Titanium same (selective with depositing)	USPAT; US-PGPUB	2003/03/08 11:43
19	8	((titanium adj silicide) same Titanium same (selective with depositing)) and @ad<=19980407	USPAT; US-PGPUB	2003/03/08 11:49
20	244	(titanium adj silicide) with titanium same (contact adj hole)	EPO; JPO; DERWENT	2003/03/08 11:47

21	6	(depositing with (titanium adj silicide)) with titanium same (contact adj hole)	EPO; JPO; DERWENT	2003/03/08 11:48
22	6	(depositing with (titanium adj silicide)) with (titanium or TiN) same (contact adj hole)	EPO; JPO; DERWENT	2003/03/08 11:48
23	17	(depositing with (titanium adj silicide)) with (titanium or TiN) same (contact adj hole)	USPAT; US-PGPUB	2003/03/08 11:51
24	5	((depositing with (titanium adj silicide)) with (titanium or TiN) same (contact adj hole)) and @ad<=19980407	USPAT; US-PGPUB	2003/03/08 11:52
25	17	(depositing with (titanium adj silicide)) same (titanium or TiN) same (contact adj hole)	USPAT; US-PGPUB	2003/03/08 11:52
26	12	((depositing with (titanium adj silicide)) same (titanium or TiN) same (contact adj hole)) not (((depositing with (titanium adj silicide)) with (titanium or TiN) same (contact adj hole)) and @ad<=19980407)	USPAT; US-PGPUB	2003/03/08 11:52
27	0	(((depositing with (titanium adj silicide)) same (titanium or TiN) same (contact adj hole)) not (((depositing with (titanium adj silicide)) with (titanium or TiN) same (contact adj hole)) and @ad<=19980407)) and @ad<=19980407	USPAT; US-PGPUB	2003/03/08 11:52
28	6	(depositing with (titanium adj silicide)) same (titanium or TiN) same (contact adj hole)	EPO; JPO; DERWENT	2003/03/08 11:54
29	1	("5930671").PN.	USPAT; US-PGPUB	2003/03/08 11:54

US-PAT-NO: 6087257

DOCUMENT-IDENTIFIER: US 6087257 A

TITLE: Methods of fabricating a selectively deposited tungsten nitride layer
and metal wiring using a tungsten nitride layer

---------- KWIC ---------

In another embodiment of the present invention the **contact hole** is formed so as
to extend into a conductive region so as to provide a portion of a side-wall of
the **contact hole** formed of the conductive material. Additionally, an ohmic
layer may be formed by forming a **titanium silicide** layer in the **contact hole**
prior to said step of selectively **depositing** a tungsten nitride layer.
Embodiments of the present invention may also include the step of forming a
metal layer in-situ in the **contact hole** after selectively depositing a tungsten
nitride layer. The metal layer is preferably formed of a material selected
from the group consisting of aluminum (Al), tungsten (W), molybdenum (Mo),
cobalt (Co), titanium (Ti), copper (Cu), platinum (Pt), a silicide compound of
aluminum (Al), tungsten (W), molybdenum (Mo), cobalt (Co), titanium (Ti),
copper (Cu) and platinum (Pt), and an alloy of aluminum (Al), tungsten (W),
molybdenum (Mo), cobalt (Co), titanium (Ti), copper (Cu) and platinum (Pt).

L Number	Hits	Search Text	DB	Time stamp
1	1	("5989999").PN.	USPAT; US-PGPUB	2003/03/08 13:29
2	298	((etching or cleaning) with silicide) same (chlorine or hydrochloric or hydrofluoric)	USPAT; US-PGPUB	2003/03/08 14:21
3	178	(((etching or cleaning) with silicide) same (chlorine or hydrochloric or hydrofluoric)) and @ad<=19980407	USPAT; US-PGPUB	2003/03/08 14:15
4	142	((((etching or cleaning) with silicide) same (chlorine or hydrochloric or hydrofluoric)) and @ad<=19980407) and selective$2	USPAT; US-PGPUB	2003/03/08 13:57
5	16	((((etching or cleaning) with silicide) same (chlorine or hydrochloric or hydrofluoric)) and @ad<=19980407) and (selective$2 with depositi$2)	USPAT; US-PGPUB	2003/03/08 13:57
6	50	(((etching or cleaning) with silicide) same (chlorine or hydrochloric or hydrofluoric)) and @ad<=19980407 and (depositing with silicide)	USPAT; US-PGPUB	2003/03/08 14:22
7	40	((((etching or cleaning) with silicide) same (chlorine or hydrochloric or hydrofluoric)) and @ad<=19980407 and (depositing with silicide)) not (((((etching or cleaning) with silicide) same (chlorine or hydrochloric or hydrofluoric)) and @ad<=19980407) and (selective$2 with depositi$2))	USPAT; US-PGPUB	2003/03/08 14:16
8	23	(cleaning with silicide) with (chlorine or hydrochloric or hydrofluoric)	USPAT; US-PGPUB	2003/03/08 14:22
9	22	((cleaning with silicide) with (chlorine or hydrochloric or hydrofluoric)) not (((((etching or cleaning) with silicide) same (chlorine or hydrochloric or hydrofluoric)) and @ad<=19980407 and (depositing with silicide)) not (((((etching or cleaning) with silicide) same (chlorine or hydrochloric or hydrofluoric)) and @ad<=19980407) and (selective$2 with depositi$2)))	USPAT; US-PGPUB	2003/03/08 14:22
10	7	(((cleaning with silicide) with (chlorine or hydrochloric or hydrofluoric)) not (((((etching or cleaning) with silicide) same (chlorine or hydrochloric or hydrofluoric)) and @ad<=19980407 and (depositing with silicide)) not (((((etching or cleaning) with silicide) same (chlorine or hydrochloric or hydrofluoric)) and @ad<=19980407) and (selective$2 with depositi$2)))) and @ad<=19980407	USPAT; US-PGPUB	2003/03/08 14:22

US-PAT-NO: 5990019

DOCUMENT-IDENTIFIER: US 5990019 A

TITLE: Selective etching of oxides

---------- KWIC ---------

Still another object of the present invention is to provide a vapor etch method
for **cleaning** a surface having an exposed refractory metal silicide such as
titanium silicide without removing significant amounts of the exposed
refractory metal silicide.

The forgoing preferred vapor phase **cleaning** solution is also useful in **cleaning**
a surface that includes a refractory metal silicide, such as **titanium silicide**.
While the ratios disclosed above for the preferred cleaning solution may be
used, the most preferred ratios are 500 sccm initiator carrier gas (i.e.
H.sub.2 O, CH.sub.3 OH, C.sub.3 H.sub.6 O, C.sub.3 H.sub.8 O, etc.), 100 sccm
HF, 100 sccm NH.sub.3, 40 Torr total pressure, and 24.degree. C. This solution
will etch thermal oxide at about 21 Angstroms/minute and titanium silicide at
about 40 Angstroms/minute, compared to titanium silicide etch rates as high as
1000 Angstroms/minute or more in 100:1 HF wet clean dip. Useful methods for
applying the preferred cleaning solution in cleaning a surface including an
exposed refractory metal silicide are illustrated in FIGS. 4 and 5.